
TOTAL
Solar
Eclipse
LIVE from
MICRONESIA
MARCH 2016

Exploratorium's eclipse history

- 1998 Aruba
- 1999 Turkey
- 2001 Zambia
- 2006 Turkey (again)
- 2008 China
- 2016 Micronesia
- 2017 U.S.A. (August 21)

Eclipse Timeline

These times are for the eclipse itself, not the broadcasts

1st Contact

Weds, March 9, 2016	00:09:59 UTC	
Tues, March 8, 2016	7:10 PM EST	Washington, DC
Tues, March 8, 2016	4:10 PM PST	San Francisco
Weds, March 9, 2016	10:10 AM CHUT	Woleai Atoll, Micronesia

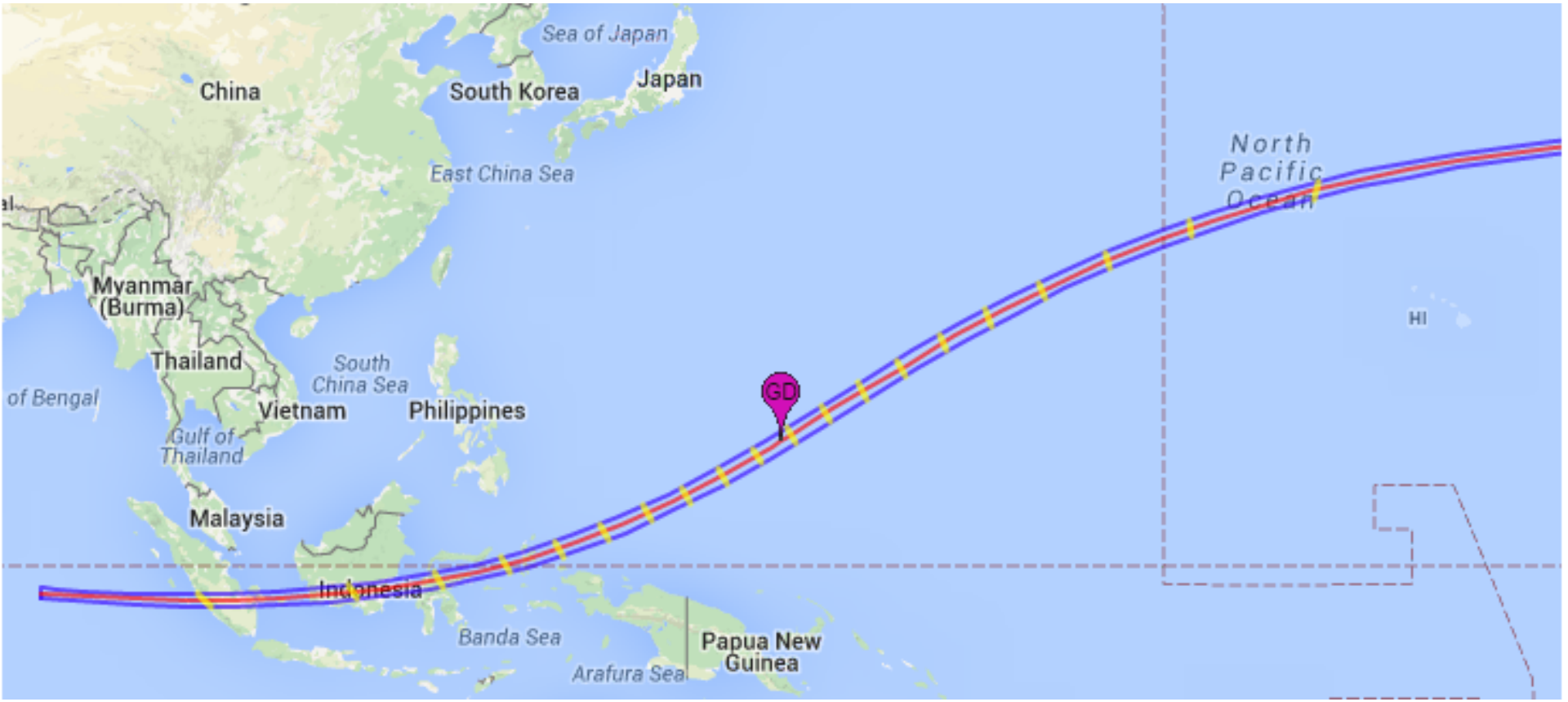
2nd Contact (Totality Begins) (duration: 4 min, 5 seconds)

Weds, March 9, 2016	01:38:07 UTC	
Tues, March 8, 2016	8:38:07 PM EST	Washington, DC
Tues, March 8, 2016	5:38:07 PM PST	San Francisco
Weds, March 9, 2016	11:38:07 AM CHUT	Woleai Atoll, Micronesia

4th Contact

Weds, March 9, 2016	03:14:39 UTC	
Tues, March 8, 2016	10:14 PM EST	Washington, DC
Tues, March 8, 2016	7:14 PM PST	San Francisco
Weds, March 9, 2016	1:14 PM CHUT	Woleai Atoll, Micronesia

The path of totality: Woleai Atoll is just before the location of greatest duration



Our Programs

We are producing:

Webcasts, blogs, videos, and dispatches from the crew in Micronesia available at:

www.exploratorium.edu/eclipse

- 2 broadcasts available via satellite: one is just telescope imagery & one is an educational program

- 4 different webcast streams: telescopes without sound, educational program, telescopes with sonification, telescopes with Spanish language commentary

- Android App with maps, telescope & program webcasts, and real time Twitter conversations

- Prior to event day, social media build up on FB, Twitter, Tumblr, and YouTube (details follow)

Telescope only feeds

This feed will be a mix from four telescopes
There are 2 audio tracks: one is silent, one has a 'sonification'

	Starts	*Ends*
Weds, March 9, 2016	00:00:01 UTC	03:15:00 UTC
Tues, March 8, 2016	7:00 PM EST	10:15 PM EST
Tues, March 8, 2016	4:00 PM PST	7:15 PM PST
Weds, March 9, 2016	10:00 AM CHUT	1:15 PM CHUT

Available via satellite on
Galaxy 17 13K upper (Orb Loc: 91' W; U/L: 14269Mhz Vertical; D/L: 11969Mhz Horizontal)
Audio Channel 1: MOS *Audio Channel 2: Sonification*

Available as two separate webcasts (one with each audio channel) at
www.exploratorium.edu/eclipse

Also Available on Android App (free on Google Play) as Exploratorium Eclipse

And on NASA TV, channel 2

Program (Education) Feed

A one-hour educational program featuring scientists & educators, hands-on demonstrations, and telescopes imagery

	Starts	*Ends*
Weds, March 9, 2016	01:00:00 UTC	02:00:00 UTC
Tues, March 8, 2016	8:00 PM EST	9:00 PM EST
Tues, March 8, 2016	5:00 PM PST	6:00 PM PST
Weds, March 9, 2016	11:00 AM CHUT	12:00 PM CHUT

Available via satellite on
Galaxy 17 13K upper (Orb Loc: 91' W; U/L: 14269Mhz Vertical; D/L: 11969Mhz Horizontal)

Available as a webcast
www.exploratorium.edu/eclipse

Also Available on Android App (free on Google Play) as Exploratorium Eclipse

And on NASA TV, channel 1

Telescope Imagery with Spanish commentary

A 30-minute program around totality that will utilize the telescope feed as imagery with added audio commentary in Spanish by Dr. Isabel Hawkins

	Starts	*Ends*
Weds, March 9, 2016	01:15:00 UTC	01:45:00 UTC
Tues, March 8, 2016	8:15 PM EST	8:45 PM EST
Tues, March 8, 2016	5:15 PM PST	5:45 PM PST
Weds, March 9, 2016	11:15 AM CHUT	11:45 PM CHUT

Not available on satellite, only online streaming at:
www.exploratorium.edu/eclipse

Our script outline

Establishing shots/welcome

About the Telescopes (and images)

Eclipse 101 (demo/animation of alignment)

Moon casting shadow on Earth

Why Woleai (path of totality, weather)

Local Color (chief, b-roll of culture days)

Space Weather (animation, sun bombards us with particles that create aurora at the poles)

Magnetosphere (protects us from sun)

Prepare for totality (Bailey's beads, diamond ring, corona)

4 min & 5 seconds of totality

Prepare for 2017 eclipse across US

How to build a solar viewer

Thanks, credits

Additional Story ideas

- NASA sends local museum folks to do broadcast
  - 4000 pounds of gear, including a c-band satellite dish
  - 15 crew (including talent)
  - 22 hours on plane, 3 days on boat

- Weather predictions for the Woleai atoll are 55-60% clear skies….*but they are adjusted by 10-15% because it is an El Nino year.* So we are at 65-75% chance of clear skies. Our contact on Woleai just notified us that they are experiencing drought conditions (and they would not be able to share any drinking water with the crew)
  - Jay Anderson http://home.cc.umanitoba.ca/~jander/tot2016/tot2016.htm

- Eclipse History
  - Ancient Chinese believed Celestial Dragon was eating sun (and they would bang on pots and pans to scare it away)
  - Ancient Mayans, using only naked-eye observing, predicted eclipses for hundreds of years into the future
  - The Chippewa Indians in N America shot flaming arrows at the sun hoping to rekindle it

- An Eclipse was used to verify Einstein's General Theory of Relativity

- Exo planets (earth-like planets revolving around stars) are discovered by 'mini-eclipses'
  - These planets (over 1,000 so far) are found by astronomers noticing a dimming in the light coming from a star. The light dims as the planet passes in front of it

- Next major eclipse is on August 21, 2017
  - Assets/maps are available at https://svs.gsfc.nasa.gov/cgi-bin/search.cgi?value=2017+eclipse&expanded=filters

Fun Eclipse Facts

Total solar eclipses are not rare, occurring roughly every year and a half. But each one is visible from only a very limited area on Earth.

- To produce a total eclipse, the sun, moon, and Earth need to line up in a straight line. Astronomers call this "syzygy" (pronounced *siz-i-gee*).
- The path from which a total solar eclipse is visible—the "path of totality"—is less than170 miles wide.
- During an eclipse, the moon's shadow races across the Earth faster than the speed of sound, more than 1,200 miles an hour.
- On either side of the "path of totality" is a region you might call the "path of partiality." From there, you can see a partial eclipse.
- Solar and lunar eclipses happen in pairs, or sometimes even trios. The full moons on either side of a solar eclipse are liable to be eclipsed as well. (This eclipse will be followed by a lunar eclipse two weeks later, on March 23.)
- From Earth, you see an eclipse as the moon passing in front of the sun and blocking its light. From the International Space Station, you'd see it as the moon's shadow cast upon the Earth, moving swiftly across its surface. (You might also see the moon passing in front of the sun.)
  (possible images: eclipse shadow from space, https://www.youtube.com/watch?v=VenATs6mP8U With the caveat: http://blogs.discovermagazine.com/badastronomy/2012/05/22/a-fake-and-a-real-view-of-the-solar-eclipse-from-space/#.VqaxLlLDfmE)
- If the moon were any other size, we would not have the total solar eclipses we do. If the moon were much bigger, it would block out both the sun and its corona; smaller and it would not cover the sun completely.

continued on next slide…..

Fun Eclipse Facts (cont.)

If the moon were at any other distance from Earth, we would not have the total solar eclipses we do. If the moon were closer, it would block out both the sun and its corona; farther away and it would not cover the sun completely.

- A curious coincidence makes the total solar eclipse possible: The sun is 400 times the diameter of our moon, but it's also 400 times farther away from us--so both bodies appear to be the same size in the sky, and the moon perfectly covers the sun.
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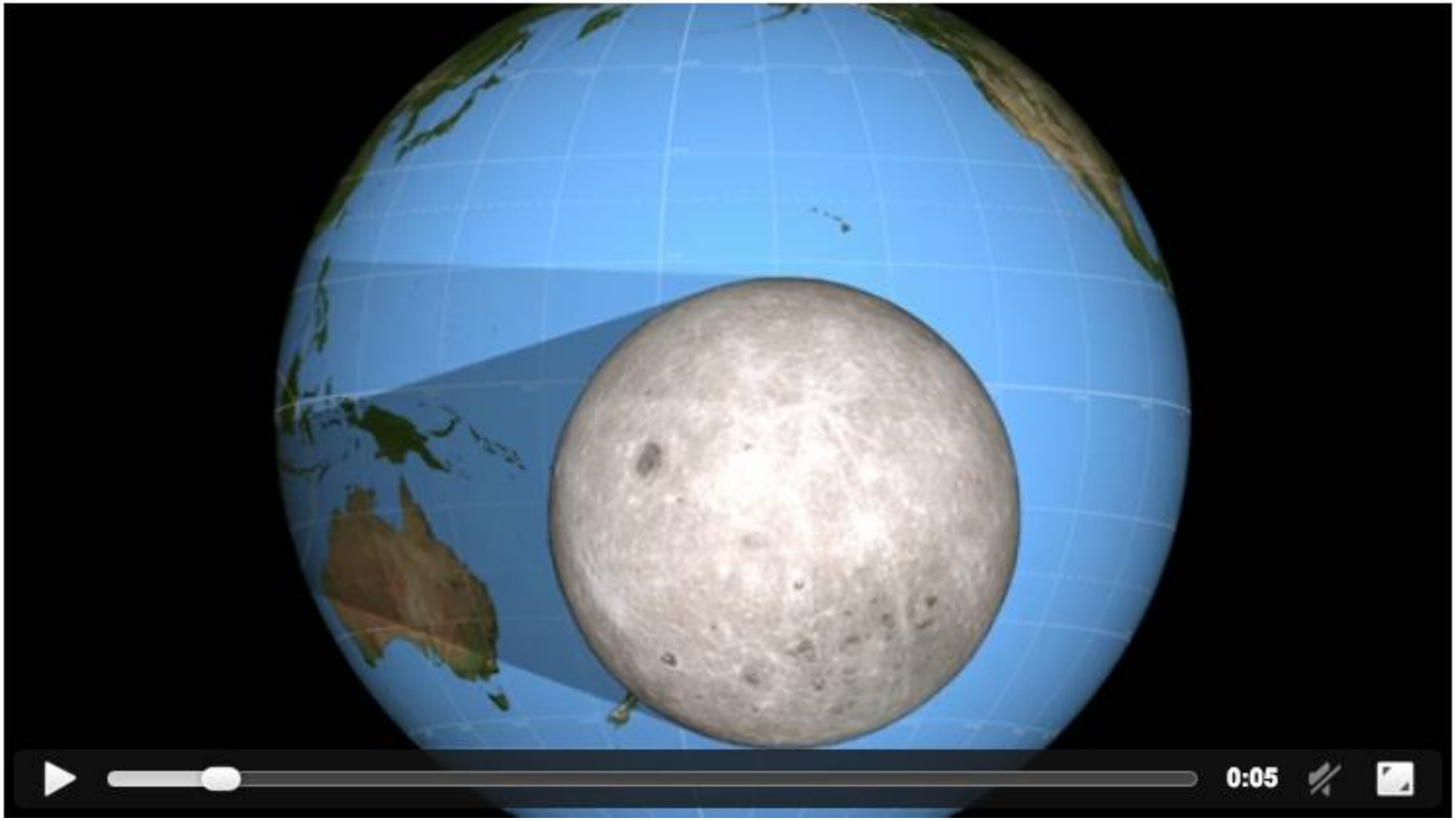
- A solar eclipse happens only during a new moon. Likewise, a lunar eclipse happens only during a full moon.

- Earth is the only planet in our solar system from which you can witness a perfect total solar eclipse. No other planet has the right-size moon.

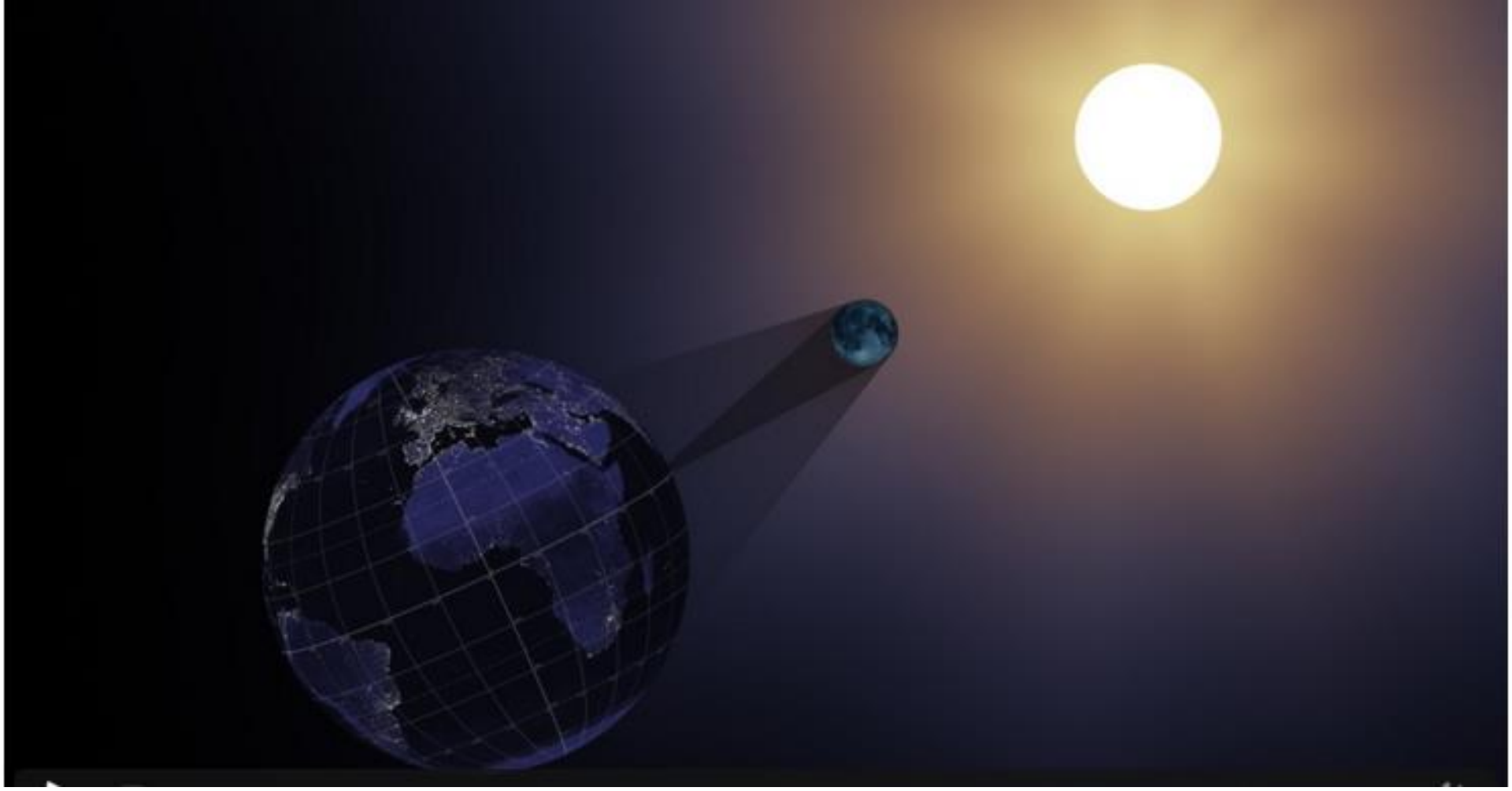
- Other planets have moons (Jupiter has 6, Uranus 12, Neptune 7, and Pluto 3), but when their moons block the sun, they block it completely, covering the solar corona as well as the body of the sun.

- If you stood in one place and waited to see a total solar eclipse, you could wait for 300 years or more. *(ask Paul D. or use world map. Find updated version of this: https://www.exploratorium.edu/eclipse/future.html look on mr.eclipse site.)*

This is a still image of a great animation made for us by NASA of the path of totality
It is available for use, at broadcast resolution here:
https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4427
Also available for 2017 at https://svs.gsfc.nasa.gov/cgi-bin/search.cgi?value=2017+eciipse&expanded=filters

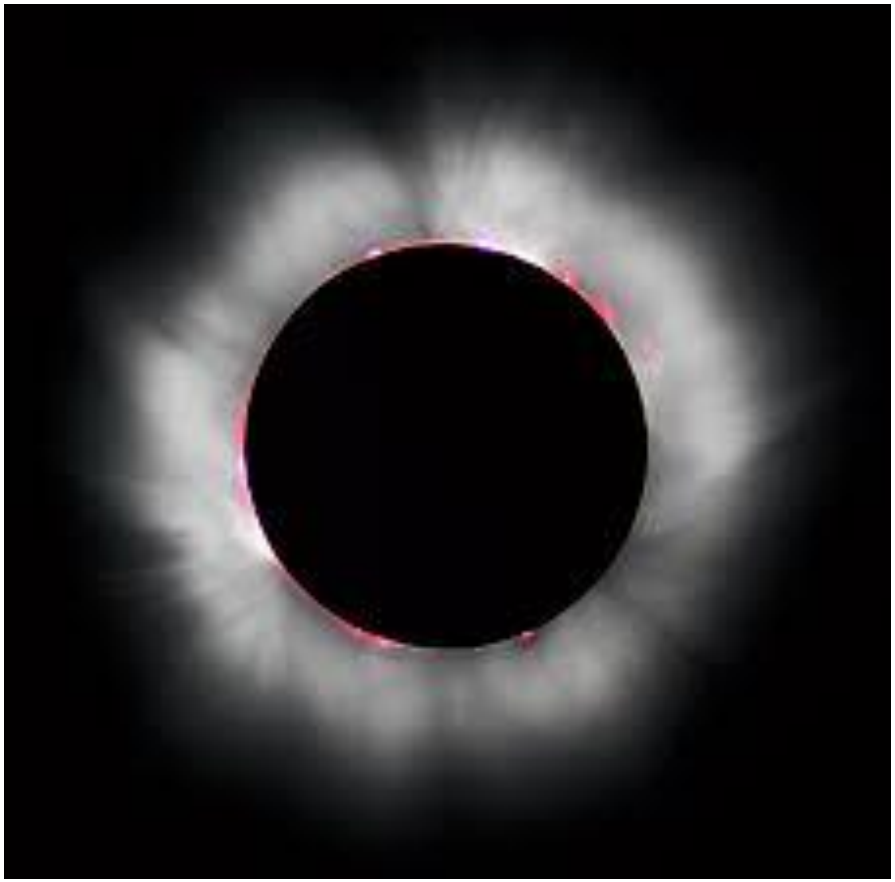


Another still of an animation that shows the shadow moving across earth
Available at broadcast resolution here:
https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4424&button=recent
Also available for 2017 eclipse at
https://svs.gsfc.nasa.gov/cgi-bin/search.cgi?value=2017+eciipse&expanded=filters



The third animation, available for download at
https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4426&button=recent

Also available for 2017 eclipse at
https://svs.gsfc.nasa.gov/cgi-bin/search.cgi?value=2017+eciipse&expanded=filters



Great stills of totality are available at mreclipse.org
He asks for a credit only

This site is by Fred Espenak, the most famous of all eclipse chasers and a retired NASA scientist

The Exploratorium has produced 10 videos available on our website (and embeddable) on safe viewing, celestial mechanics, Einstein's Light Bending concept, etc.
www.exploratorium.edu/eclipse

Exploratorium Local Contacts

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